

## **REMARKS**

Applicants address the examiner's remarks in the order presented in the Office Action (dated July 1, 2004). All claim amendments are made without prejudice and do not represent an acquiescence in any ground of rejection.

### **STATUS OF THE CLAIMS**

Claims 5, 6, 21, 51, and 52 are cancelled. Claims 53-65 are new. Therefore claims 53-65 will be pending after entry of this amendment. Support for the new claims is found in the claims as originally filed and throughout the specification and in the drawings. In addition, Applicant's representative lists the new claims with features labeled as shown in the drawings:

Claim 53. (New) A microscope comprising:  
an imaging system for creating an image of an object plane (216) using an illumination light beam (52) of a first wavelength comprising a plurality of lenses (206) (210) (212) positioned along a main optical axis (202) of the microscope, and an optical output device (232) for creating an image of the object plane on the image plane (232);

a system for automatically focusing said image in said microscope, said system for automatically focusing comprising:

an autofocusing light beam (40) of a second wavelength, the autofocusing light beam being directed to reflect off the object plane (16);

an autofocusing detection device (50) comprising a detection system lens (46) for receiving the reflected autofocusing light beam and directing the reflected autofocusing light beam onto a detection surface (142);

a plurality of light sensors (108, 110, 112, 114) adapted to measure the light intensity of the reflected autofocusing light beam at said detection surface (142), wherein the distance that the image of the object plane (216) is displaced from a desired focus reference surface (23) is determined by comparing the intensities measured by the plurality of sensors;

characterized in that the imaging system further comprises:

a probe arm (213) supporting the plurality of lenses, said probe arm extending generally along the main optical axis (202);

a scanning stage (240) and a support (219) on which an object plane (216) to be examined is placed, wherein the object plane (216) substantially extends along a focus plane that is observed through the microscope, and wherein the object plane (216) is substantially parallel to the main optical axis (202).

Claim 54. (New) The microscope according to claim 53, wherein the scanning stage (240) and the support (219) are positioned on a separate table (242) than the table (244) of the probe arm (213) of the microscope, such that the probe arm (213) is substantially isolated from vibrations created by the scanning stage (240).

Claim 55. (New) The microscope according to claim 53, wherein the probe arm (213) is positioned between the object to be examined and the scanning stage (240).

Claim 56. (New) The microscope according to claim 53, wherein the probe arm (213) is substantially elongated so that the optical output device (230) is positioned distant from the object to be examined.

Claim 57. (New) The microscope according to claim 53, wherein the object is placed in a sampled holding device (218).

Claim 58. (New) The microscope of claim 53, wherein the autofocus detection device (50) further comprises a prism (100) positioned between the detection system lens (46) and the plurality of light sensors (108, 110, 112, 114), said prism (100) being configured to divide the autofocus beam into at least two separate beams (118) (120), the plurality of light sensors comprising at least two sensor pairs (104, 106), the first sensor pair (104) being substantially aligned with a first light beam (118) from the prism, the second sensor pair (106) being substantially aligned with a second light beam (120) from the prism, said sensor pairs measuring the intensity of the light beam that strikes each sensor pair.

Claim 59. (New) The microscope of claim 53, wherein the imaging system further comprises an objective lens (14), and wherein the autofocus detection device further comprises a cylindrical lens (140) positioned between the detection system lens (46) and the plurality of light sensors (108, 110, 112, 114), said cylindrical lens (140) being configured to change the shape of a light spot on the plurality of diodes (108, 110, 112, 114) when the distance between the object plane (16) and objective lens (14) of the imaging system changes.

Claim 60. (New) The microscope of claim 53, wherein the plurality of light sensors comprises a quad photo diode (144) with four distinct diode segments (146) (148) (150) (152).

Claim 61. (New) The microscope of claim 53, wherein the system for automatically focusing further comprises a feedback controller (70) and focus adjusting device (72) for automatically adjusting the distance between the objective lens (14) and the object plane (16), based on the reflected autofocusing light beam sensed by said light sensors, in order to properly focus the image in the imaging system.

Claim 62. (New) The microscope of claim 53, wherein the focus adjusting device (72) is configured to adjust the position of the objective lens (14) in order to properly focus the imaging system on the object plane (16).

Claim 63. (New) The microscope of claim 53, further comprising a second optical axis (64), the second optical axis being positioned between the focus plane and the main optical axis (202), the second optical axis being substantially perpendicular to the main optical axis.

Claim 64. (New) The microscope of claim 53, further comprising a third optical axis being positioned between the main optical axis (202) and image plane in the optical output device, the third optical axis being configured at an angle relative to the main optical axis.

Claim 65. (New) The microscope of claim 53, wherein the illumination light beam (52) and autofocusing light beam (40) are selected to have different wavelengths so that the light beams do not interfere with one another.

Claims 5, 6, 21 stand rejected under 35 U.S.C. §112, second paragraph, as being indefinite.

Claims 51 and 52 stand rejected under 35 U.S.C. §102(e) as being anticipated by Ulrich *et al.* (U.S. Patent 6,738,189).

Claims 5, 6, and 21 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Ulrich *et al.* in view of Sato *et al.* (U.S. Patent 5,530,237).

#### **OBJECTIONS TO THE DRAWINGS**

The drawings were objected to under 37 C.F.R. §1.82(a). More specifically, the examiner stated that the drawings must show every feature of the invention specified in the claims and stated that the autofocusing system in combination with the unfolded microscope system must be shown or the feature(s) canceled from the claim(s). The examiner requested a proposed drawing correction or corrected drawings in reply to the Office Action to avoid abandonment of the application.

Applicants' representative has amended the claims for greater clarity in an attempt to show every feature of the invention specified in the claims is also shown in the drawings. Applicants' representative welcomes a telephone conference from the examiner if the current amendments do not address the objection to the drawings.

#### **OBJECTIONS TO THE SPECIFICATION**

The examiner objected to the specification. More specifically, the examiner was of the view that the title of the invention was not descriptive. The examiner required a new title that was more clearly indicative of the invention to which the claims are directed. Applicants' representative has amended the title for clarity. Therefore the objection to the specification should be withdrawn.

#### **REJECTIONS UNDER 35 U.S.C. §112**

Claims 5, 6, 21 were rejected under 35 U.S.C. §112, second paragraph, as allegedly being indefinite. Applicants have cancelled claims 5, 6, 21, 51, and 52 in order to expedite prosecution of this application. Applicants have added new claims 53-65 to provide greater clarity and consistency of claim language. Without acceding to the propriety of the rejection under 35 U.S.C. §112, second paragraph, Applicants respectfully request reconsideration of the claims as amended. For this reason, Applicants request that the examiner withdraw the rejection of the pending claims under 35 U.S.C. §112, second paragraph.

#### **REJECTIONS UNDER 35 U.S.C. §102**

Claims 51 and 52 were rejected under 35 U.S.C. §102(e) as allegedly being anticipated by Ulrich *et al.* (U.S. Patent 6,738,189).

Regarding claims 52 and 51, the examiner stated that Ulrich *et al.* disclose (see Fig. 3) a microscope for viewing an object plane, comprising: a plurality of lenses (6, 8) positioned along a main optical axis of the microscope; a probe arm (vertical cross-hatched portion) supporting the plurality of lenses, the probe arm extending generally along the main optical axis; a support (stage; not labeled) on which an object with an object plane to be examined is placed, the object plane substantially extended along a focus plane that is observed through the microscope; and an optical output device (at 3 or at 12) for creating an image of the object plane on an image plane, wherein the main optical axis is unfolded and substantially extends

along a single plane, wherein the probe arm is substantially elongated so that the optical output device is positioned distant from the object to be examined. The examiner further stated that Ulrich *et al.* also disclose (see Fig. 3) a scanning stage connected to the support on which the object to be examined is positioned; and the support is separate from the probe arm such that the probe arm and the stage are substantially vibrationally isolated from each other as claimed.

The present invention as claimed, and in particular the features of a plurality of light sensors, which when used in combination to measure the light intensity of the reflected autofocusing light beam in order to detect the distance that the image of the object plane is displaced from a focus reference surface, is not anticipated by Ulrich *et al.*

Without acceding to the propriety of the rejection of pending claims 51 and 52 under 35 U.S.C. §102, Applicants have cancelled claims 51 and 52 without prejudice and respectfully request reconsideration of the claims as amended. For these reasons, Applicants request the examiner to withdraw the rejection of pending claims 51 and 52 under 35 U.S.C. §102.

### **REJECTIONS UNDER 35 U.S.C. §103**

Claims 5, 6, and 21 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Ulrich *et al.* in view of Sato *et al.* (U.S. Patent 5,530,237).

As noted by the examiner, Ulrich *et al.* do not specifically disclose an autofocusing system as claimed. However, the examiner holds the view that Sato *et al.* teach (see Fig. 1) an apparatus for automatically focusing a microscope comprising, an objective lens (2), an illumination beam source (10) emitting visible light, an imaging lens (3), an autofocusing light beam source emitting infrared light (17), a beamsplitter (7), a detection system lens (18), and an autofocus detecting device comprising, sensor (22), an iris (21), an auxiliary beam splitter (19), a auxiliary light sensor (20), and a focusing correction system which determines the displacement of the image plane from a preferred reference plane (Col. 5, lines 24-27 and Col. 6, lines 53-59). Therefore, the examiner is of the opinion that it would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide an autofocusing system of Sato *et al.* in the microscope of Ulrich *et al.* to improve imaging and optimize focusing.

Applicants' arguments expressed above regarding the rejections under 35 U.S.C. §102 are also applicable here.


In addition to the arguments above, the new claims rely on autofocusing light beam generated by a single light source. Furthermore, the present invention provides a microscope which comprises an imaging system for creating an image and a system for automatically focusing, said system comprising a plurality of light sensors. These features in the new claims result in a significant increase in the speed and capacity of sample analysis while maintaining a high accuracy. The features further allow the analysis of non-flat biological samples, such as living cells.

Without acceding to the propriety of the rejection of pending claims 5, 6, and 21 under 35 U.S.C. §103, Applicants have cancelled claims 5, 6, and 21 without prejudice and respectfully request reconsideration of the claims as amended. For these reasons, Applicants request the examiner to withdraw the rejection of pending claims 5, 6, and 21 under 35 U.S.C. §103.

The foregoing represents a *bona fide* attempt to advance the present case to allowance. Applicants submit that this application is now in condition for allowance.

Accordingly, an indication of allowability and an early Notice of Allowance are respectfully requested. If the Examiner believes that a telephone conference would expedite prosecution of this application, please telephone the undersigned at 206-332-1380.

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Andrew T. Serafini  
Registration No. 41,303

Woodcock Washburn LLP  
One Liberty Place - 46th Floor  
Philadelphia PA 19103  
Telephone: (215) 568-3100  
Facsimile: (215) 568-3439